CLAIMS

What is claimed is:

1. A compound comprising:

a polymeric chain;

an acid labile group attached to the polymeric chain; and

at least one hydrophilic group attached to the acid labile group.

2. The compound of claim 1, wherein the at least one hydrophilic group comprises a hydroxyl group.

3. The compound of claim 1, wherein the at least one hydrophilic group comprises a plurality of hydroxyl groups.

4. The compound of claim 1, wherein the at least one hydrophilic group comprises a sulfhydryl group.

5. The compound of claim 2, wherein the acid labile group comprises an organic group having the hydroxyl group attached thereto.

6. The compound of claim 5, wherein the organic group comprises an alicyclic group.

7. The compound of claim 6, wherein the alicyclic group comprises a ring selected from a monocyclic ring and a polycyclic ring.

8. The compound of claim 7, wherein the alicyclic group comprises a group selected from C_{1-6} cyclopentyl, C_{1-6} cyclohexyl, C_{1-6} adamantyl, and norbornyl.

9. The compound of claim 8, wherein the alicyclic group comprises methyl adamantyl.

10. The compound of claim 1, wherein the polymeric chain comprises a (meth)acrylate chain.

11. A composition comprising:

the compound of claim 1; and

a radiation sensitive acid generator capable of generating an acid if exposed to radiation.

12. A method comprising:

applying a layer of the composition of claim 11 over a substrate;

heating the applied layer;

after said heating the layer, exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;

heating the exposed layer; and

after said heating the exposed layer, developing the exposed layer by contacting the exposed layer with a developer and then removing the developer.

13. A compound comprising:

a polymeric chain;

a dissolution inhibitor attached to the polymeric chain to inhibit dissolution of the polymeric chain in a developer; and

at least one hydrophilic group attached to the dissolution inhibitor.

14. The compound of claim 13, wherein the at least one hydrophilic group comprises a hydroxyl group.

15. The compound of claim 13, wherein the at least one hydrophilic group comprises a sulfhydryl group.

16. The compound of claim 14, wherein the dissolution inhibitor comprises an alicyclic group.

17. The compound of claim 16, wherein the alicyclic group comprises a ring selected from a monocyclic ring and a polycyclic ring.

18. The compound of claim 17, wherein the alicyclic group comprises one selected from C_{1-6} cyclopentyl, C_{1-6} cyclohexyl, C_{1-6} adamantyl, and a group including norbornyl.

19. A composition comprising:

the compound of claim 13; and

a radiation sensitive acid generator capable of generating an acid if exposed to radiation.

20. A method comprising:

applying a layer of the composition of claim 19 over a substrate;

heating the applied layer;

after said heating the layer, exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;

heating the exposed layer; and

after said heating the exposed layer, developing the exposed layer by contacting the exposed layer with a developer and then removing the developer.

21. A composition comprising:

a radiation sensitive acid generator capable of generating an acid if exposed to radiation; and

a compound capable of reacting with the acid, the compound including:

a polymeric chain;

an acid labile group attached to the polymeric chain to inhibit dissolution of the polymeric chain in a developer, wherein the acid labile group is capable of detaching from the polymeric chain by reacting with the acid; and

at least one hydroxyl group attached to the acid labile group.

22. The composition of claim 21, wherein the acid labile group comprises an alicyclic group including a ring selected from a monocyclic ring and a polycyclic ring.

23. The composition of claim 22, wherein the alicyclic group comprises one selected from C_{1-6} cyclopentyl, C_{1-6} cyclohexyl, C_{1-6} adamantyl, and a group including norbornyl.

24. The composition of claim 23, wherein the alicyclic group comprises methyl adamantyl.

25. A method comprising:

applying a layer of the composition of claim 21 over a substrate;

heating the applied layer;

after said heating the layer, exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;

heating the exposed layer; and

after said heating the exposed layer, developing the exposed layer by contacting the exposed layer with a developer and then removing the developer.

26. A method comprising:

forming a layer of a composition over a substrate;

exposing the layer to patterned radiation;

generating an acid by photolysis of a radiation-sensitive acid generator of the composition;

detaching an acid labile group having a hydrophilic group attached thereto from a polymeric chain of the composition by reacting the acid labile group with the acid; and

developing the layer including contacting the layer with a developer, wetting the hydrophilic group with the developer, dissolving the detached group in the developer, dissolving the polymeric chain in the developer, and removing the developer.

27. The method of claim 26, wherein dissolving the detached group in the developer comprises forming a hydrogen bond between a hydroxyl group of the detached group and the developer.

28. The method of claim 26, wherein exposing the layer to the radiation comprises wetting the hydrophilic group of the detached group with an immersion lithography fluid.

29. The method of claim 28, wherein wetting the hydrophilic group with the fluid comprises forming a hydrogen bond between a hydroxyl group and the fluid.

30. The method of claim 26, wherein detaching the acid labile group comprises heating the exposed layer to promote the reaction.